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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/756,971	01/09/2001	Salman Akram	MI22-1572	7766

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EXAMINER

JONES, JOSETTA I

ART UNIT	PAPER NUMBER
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2812

DATE MAILED: 12/05/2001

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/756,971

Applicant(s)

AKRAM, SALMAN

Examiner

Josetta I. Jones

Art Unit

2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE \_\_\_\_ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 42-74 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 63-74 is/are allowed.
- 6) ☒ Claim(s) 28, 42 and 55-57 is/are rejected.
- 7) ☒ Claim(s) 49-54, 58-62 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 January 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2, 4, 5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

*Drawings*

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: 58b and 58c.

Correction is required.

*Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

Claims 45 and 57 are rejected under 35 U.S.C. 102(e) as being anticipated by Hamzehdoost, U.S. Patent No. 5,999,415.

With regard to claim 45, Hamzehdoost discloses providing an insulative having circuitry thereon and an opening therethrough (see column 4, lines 55-67 and column 5, lines 1-2); adhering a semiconductive material comprising die to the substrate and electrically connecting circuitry supported by the die with the circuitry on the substrate utilizing a plurality of electrical interconnects extending through the opening (see column 5, lines 3-7 and figure 3); and joining a metal foil to the substrate, the metal foil having a segment extending over the die and in physical contact with at least a portion of the die (see column 4, lines 45-52 and figure 3).

With regard to claim 57, Hamzehdoost discloses providing an insulative substrate having circuitry thereon and an opening therethrough, the substrate having a pair of opposing surfaces, the surfaces being a first surface and a second surface, the circuitry being on the first surface (see figure 3 and column 4, lines 55-67); adhering a metal foil to the second surface (see figure 3 and column 4, lines 45-52); adhering a semiconductive-material-comprising die to the metal foil, the die having circuitry supported thereby (see figure 3 and column 4, lines 45-52); and electrically connecting the circuitry supported by the die to the circuitry on the substrate with a plurality of electrical interconnects extending through the opening (see figure 3 and column 5, lines 3-7).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 42-44, 46-48 and 55-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hamzehdoost as applied to claims 45 and 57 above, and further in view of Tummala et al.

With regard to claim 42, Hamzehdoost discloses providing an insulative substrate having circuitry thereon and an opening therethrough (see column 4, lines 55-67 and figure 3); adhering a semiconductive material comprising die to the substrate (see figure 3 and column 5, lines 3-7); electrically connecting the circuitry supported by the die to the circuitry on the

substrate with a plurality of electrical interconnects extending through the opening (see figure 3 and column 5, lines 3-7).

Hamzehdoost fails to disclose adhering a semiconductive material comprising die to the substrate with an electrically conductive adhesive. Tummala et al disclose the use of an electrically conductive adhesive to adhere die to substrates (see Tummala, vol. III at pp. 223-234). It would have been obvious to one skilled in the art at the time of the invention to use an electrically conductive adhesive to adhere the semiconductive material to the substrate because these types of adhesives are reliable, provide good conductive interconnection, and have become suitable substitutes for Sn-Pb solder connections.

With regard to claim 43, Hamzehdoost fails to disclose wherein the electrically conductive adhesive comprises silver-filled epoxy. Tummala et al disclose wherein the electrically conductive adhesive comprises silver-filled epoxy (see Tummala, vol. III at 229). It would have been obvious to one skilled in the art at the time of the invention to use a silver filled epoxy because silver provides good conduction.

With regard to claim 44, Hamzehdoost discloses wherein the die has a surface, and further comprising placing a metal foil in physical contact with at least a portion of the die surface (see figure 3 and column 4, lines 49-50). It would have been obvious to one skilled in the art at the time of the invention to place a metal foil in physical contact with at least a portion of the die surface because the metal foil dissipates the heat that emanates from the die.

With regard to claim 46, Hamzehdoost fails to disclose wherein joining the metal foil to the substrate comprises welding the metal foil to the substrate by melting a portion of the metal foil with a portion of the substrate. Tummala et al disclose wherein the joining the metal foil to the substrate comprises welding the metal foil to the substrate by melting a portion of the metal foil with a portion of the substrate (see Tummala, vol II at 898-901). It would have been obvious

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to one skilled in the art at the time of the invention to weld the metal foil to the substrate because welding is a well known method of bonding to metals together.

With regard to claim 47, Hamzehdoost fails to disclose wherein the melting is accomplished with a laser. Tummala et al disclose wherein the melting is accomplished with a laser (see Tummala, vol II at 898-901). It would have been obvious to one skilled in the art at the time of the invention to melt the foil with a laser because melting with lasers is a well known method.

With regard to claim 48, Hamzehdoost fails to disclose wherein the joining the metal foil to the substrate comprises adhering the metal foil to the substrate with an electrically conductive epoxy. Tummala et al disclose the use of an electrically conductive adhesive to adhere die to substrates (see Tummala, vol. III at pp. 223-234). It would have been obvious to one skilled in the art at the time of the invention to use an electrically conductive adhesive to adhere the semiconductive material to the substrate because these types of adhesives are reliable, provide good conductive interconnection, and have become suitable substitutes for Sn-Pb solder connections.

With regard to claim 55, Hamzehdoost fails to disclose wherein the metal foil is selected from the group consisting of copper foil and aluminum foil. Examiner takes official notice that it would have been obvious to one skilled in the art at the time of the invention to select a metal foil consisting of copper foil and aluminum foil because these are well known metal foils.

With regard to claim 56, Hamzehdoost fails to disclose adhering a semiconductive material comprising die to the substrate with an electrically conductive adhesive. Tummala et al disclose the use of an electrically conductive adhesive to adhere die to substrates (see Tummala, vol. III at pp. 223-234). It would have been obvious to one skilled in the art at the time of the invention to use an electrically conductive adhesive to adhere the semiconductive

material to the substrate because these types of adhesives are reliable, provide good conductive interconnection, and have become suitable substitutes for Sn-Pb solder connections.

***Allowable Subject Matter***

Claims 49-54, 58-62 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 63-74 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: the prior art of record fails to disclose a first surface facing the substrate and a second surface in opposing relation to the first surface, the foil being in physical contact with only a portion of the second surface; and joining a metal foil to the substrate and extending the metal foil over the plurality of dies.

***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Karnezos, U.S. Patent No. 6,020,637; Niwa, U.S. Patent No. 5,998,241; Akram, U.S. Patent No. 6,214,641; Jiang et al., U.S. Patent No. 6,048,755; Chen et al., U.S. Patent No. 6,215,180; Malladi et al., U.S. Patent No. 5,972,736.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Josetta I. Jones whose telephone number is 703-308-5871. The examiner can normally be reached on M-F 9:00-6:30 and alternating Fridays 9:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John F. Niebling can be reached on 703-308-3325. The fax phone numbers for the

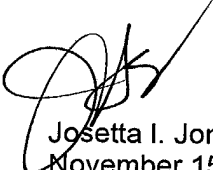
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organization where this application or proceeding is assigned are 703-305-3432 for regular communications and 703-305-3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.



Josetta I. Jones  
November 15, 2001



John F. Niebling  
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